Remarks

In response to the Examiner's Office Action, Applicant has amended the claims to overcome the Examiner's formal objections, and has carefully considered the prior art and the Examiner's rejections, and is presenting amendments and the following remarks, which Applicant submits collectively render the claims allowable over the prior art.

The present claims are directed to concepts relating to injectors having air-purging functions, and methods for using such injectors, that may be generally described in four categories.

A first category of concepts relates to injectors that detect a size and type of a pre-filled syringe and associate the detected syringe size/type with a predetermined purge stop point that is used when performing a purge. As recited in claim 1, an injector in accordance with this concept has "a memory storing a predetermined purge stop point associated with the size and type of [the] pre-filled syringe", and will "automatically advance the plunger drive ram an amount substantially equal to the predetermined purge stop point" to purge the syringe. Method claim 18 recites "automatically determining a syringe size and type for [the] pre-filled syringe" and then "automatically energizing a motor for the period necessary to move a ram to a predetermined purge stop point based on the syringe size and type."

A second category of concepts relates to injectors that purge an amount of air added to a user-filled syringe as the syringe is filled, adjusting at the same time for mechanical clearance. As recited in claim 6, the injector has "a memory storing a predetermined purge stop point representative of the approximate known amount of air added by aeration during filling in the user-filled syringe and

the mechanical clearance between the plunger drive ram and the syringe plunger", and is "configured to automatically advance the plunger drive ram an amount substantially equal to the predetermined purge stop point". Method claim 19 recites "allowing a user to fill [a] syringe" and then "automatically energizing a motor for the period necessary to move a ram to a predetermined purge stop point representative of the approximate known amount of air added by aeration ... and the mechanical clearance between the plunger drive ram and the syringe plunger."

A third category of concepts relates to purging of air from syringes installed on a dual-head injector. As recited in claim 11, a dual head injector has "a first head configured to receive a first syringe" and "a second head configured to receive a second syringe", and "Y-tubing coupling the first and second syringe". The injector is "configured to automatically purge substantially all of the air from the first and second syringes and the Y tubing". Method claim 30 recites a method of "automatically purging air from a dual head injector" that involves "energizing a motor of a first head for the period necessary to move a ram to a predetermined purge stop point", and "energizing a motor of a second head for the period necessary to move a ram to a predetermined purge stop point".

A fourth category of concepts relates to purging of air from an injector that has an air detector. As recited in claim 25, this method involves "monitoring an air detector proximate a syringe" while "energizing a motor to move a ram to advance a plunger of the syringe", and "stopping the ram when a predetermined condition is reached after air is no longer detected". The predetermined condition may be, e.g., purging of an additional amount of air required to remove air from tubing connected to the syringe, or other conditions that occur after air is no longer detected.

With this background, the Examiner's rejections may be analyzed. The Examiner has cited the Battiato '710 patent as anticipating all claims presented. Applicant respectfully submits that the claims recite inventions that are neither anticipated by or suggested by Battiato.

In summary Battiato shows a single-head injector that includes an air detection module that is generally described at col. 2, lines 19-37, and described in more detail starting at col. 13, line 26. (The air detector is the subject of claims in a divisional of the '710 patent, U.S. Patent 6,004,292.) The Battiato patent describes the air detector with reference to Figs. 9 and 10, which show the manner in which light is coupled to the neck of the syringe to determine if air or fluid is present there. As stated in the col. 2 discussion cited above, this "permits the injector to detect air in the tip of the syringe, and if air is detected, to halt any prospective or ongoing injection. Since air is detected prior to exit from the syringe and before passage through the tubing leading to the patient, rather than at some intermediate point along the tubing, the injector is more likely to detect air early enough to prevent or halt the injection before air reaches the patient."

Battiato also discusses the use of the air detector in connection with syringe filling. Specifically, at col. 21, lines 4-8, it is stated "the air bubble detector may be used in connection with the power head control circuitry to perform an automatic syringe-filling function, e.g., to detect when air has been evacuated from the syringe after filling."

While Battiato thus discloses an air detector and, generally, its use in purging, notably, Battiato does not include disclosure directed to any of the four specific concepts noted above.

Specifically, there is no disclosure in Battiato directed to detecting a size and type of a pre-filled syringe and using this information to obtain and use an associated predetermined purge stop point. While there is disclosure of identifying a syringe size and type from magnets in a faceplate (see, e.g., col. 9 lines 21-32), there is no discussion of using this information to determine a purge stop point.

Also, there is no disclosure in Battiato directed to determining the amount of air introduced in a syringe during user filling so that the appropriate amount may be purged, and/or correcting for mechanical clearance in an injector in purging.

Further, there is no disclosure in Battiato directed to a dual head injector or purging air from dual syringes and Y-tubing connecting them.

Finally, there is no disclosure in Battiato of purging air using an air detector, in which the ram is stopped "when a predetermined condition is reached after air is no longer detected". The text quoted above from col. 21 of Battiato does not suggest that additional conditions should be reached after air is no longer detected in the syringe; this is an enhancement of what is disclosed by Battiato and is patentable over Battiato.

In summary, Applicant submits that, based on the foregoing, each of the independent claims 1, 6, 11, 18, 19, 25 and 30 are allowable for the reasons identified above, and requests early transmission of a Notice of Allowability.

If any petition for extension of time is necessary to accompany this communication, please consider this paper a petition for such an extension of time, and apply the appropriate extension

of time fee to Deposit Account 23-3000. If any other charges or credits are necessary to complete this communication, please apply them to Deposit Account 23-3000.

Respectfully submitted,

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